

Before the  
Federal Communications Commission  
Washington, D.C. 20554

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Federal Communications Commission  
Office of Secretary

In the Matter of )  
)  
Revision of the Commission's Rules )  
to Ensure Compatibility with )  
Enhanced 911 Emergency Calling Systems )

CC Docket No. 94-102

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**OPPOSITION OF KSI INC. AND MULOC INC.  
TO PETITIONS FOR RECONSIDERATION AND CLARIFICATION**

KSI Inc. and MULOC Inc., the developer and owner respectively of location-determination technology (collectively "KSI"), hereby submits this Opposition pursuant to Section 1.429(f) of the Commission's Rules in the above-referenced proceeding.<sup>1</sup>

The Commission received 16 petitions for reconsideration and/or clarification of its Report and Order which established a reasonable timetable for the implementation of Enhanced 911 ("E911") services to meet a critical public safety objective -- speeding the delivery of assistance to people in need of help in emergency situations.<sup>2</sup> Almost all of the petitions were filed by either manufacturers of wireless-telecommunications equipment or providers of wireless-telecommunications service. KSI does not address herein some of the points raised in these petitions regarding, for example, code identification, scope of liability, and cost recovery. KSI does object

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<sup>1</sup> In the Matter of Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, RM-8143, FCC 96-264, released July 26, 1996 (Report and Order and Further Notice of Proposed Rulemaking) ("Report and Order").

<sup>2</sup> A total of 16 formal petitions were timely filed. Motorola timely filed a letter responding to the Report and Order.

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to those petitions that contend that the five-year deadline for Phase II implementation, which requires carriers to provide location information within a 125 meter radius "root mean square" ("rms"), is "unrealistic and should be eliminated<sup>3</sup>" or that "it is still too soon to determine the accuracy that will be possible<sup>4</sup>" or that "compliance with the Phase II implementation schedule does not appear technically feasible.<sup>5</sup>" KSI also opposes the recommendation proposed by the Telecommunications Industry Association ("TIA") that would abandon the use of root-mean-square techniques to define the Phase II location requirement.<sup>6</sup> Finally, KSI supports the Commission's specification of latitude and longitude for the representation of the location information.

A. The Commission Should Reject Arguments that the Phase II Implementation Schedule Is Unrealistic.

In the interest of public safety, the Report and Order has mandated *inter alia* that, within five years, CMRS E911 capabilities be established that will enable wireless caller location information of specified accuracy to be provided to public safety answering point ("PSAP") operators. Numerous petitioners have claimed that the necessary technology will not be available or cannot be implemented within the required time limit, and typically cite as justification that the technology is not now commercially available from communications-equipment manufacturers. Such suggestions

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<sup>3</sup> BellSouth Corporation Petition for Reconsideration at 10 ("BellSouth Petition").

<sup>4</sup> Nokia Telecommunications, Inc. Petition for Reconsideration at 3 ("Nokia Petition").

<sup>5</sup> Personal Communications Industry Association Petition for Reconsideration at 12 ("PCIA Petition").

<sup>6</sup> Petition for Reconsideration and Clarification of the Mobile and Personal Communications Division of the Telecommunications Industry Association at 19. ("TIA Petition").

ignore both the Commission's five-year preparation period as well as the example data and extensive demonstrations of localizations of current, off-the-shelf cellular telephones that KSI has provided over recent years in its Comments, Reply Comments, *ex parte* filings, and Additional Comments, and in its numerous public and private demonstrations for the communications and transportation communities. Thus, KSI urges the Commission to maintain its resolve to promote public safety through the promulgation and enforcement of its location requirements and standards.

In seeking to dissuade the Commission from maintaining strict localization requirements for wireless E911, various petitioners and numerous prior commentors have argued that thoroughly tested, commercial, localization systems are not currently available to implement the required ALI capabilities, and that they can not "guarantee" that such systems will be available in five years. As expressed in prior comments, KSI concurs that the necessary localization systems are currently under development and testing by localization-equipment manufacturers. Certainly no entity can "guarantee" the exact future date of their commercial availability, particularly if negativism on the part of some communications organizations acts to slow sources of funding for the advancement of the localization systems production.

Nevertheless, KSI strongly supports the Commission's establishment of E911 localization requirements that are precisely specified both in accuracy and in time limit for implementation. KSI has already provided data demonstrating that the necessary capabilities have been technically feasible for years. KSI has also seen that, since the Commission's initiation of the wireless E911 docket, the communications industry has begun to take earnest interest in the localization facilities that will be needed to meet the Commission's requirements. The previous absence of localization requirements supported the lack of interest in aggressive implementation of localization facilities by

wireless carriers, and resulted in the current lack of availability of such facilities.

TIA takes issue with the Commission's statement in the Report and Order that "[w]hile *some* wireless carriers see obstacles to implementing Phase II in five years, the equipment manufacturers believe a five-year deadline is achievable."<sup>7</sup> In support, TIA suggests that both Motorola and Northern Telecom ("NorTel") believe that a five-year deadline is "excessively optimistic."<sup>8</sup> Even assuming that Motorola and NorTel share TIA's view, KSI and others have well established the accuracy and viability of location technology *today*. In fact, Motorola's comments on the Consensus Agreement state that "five years is a facially reasonable timeframe" and that "it is in Motorola's economic interest to develop a cost-effective wireless ALI system."<sup>9</sup> Motorola's subsequent filings in this proceeding also do not support TIA's call for the abandonment of the Phase II implementation schedule.<sup>10</sup> NorTel did not characterize the Phase II implementation schedule as "excessively optimistic." Its Comments cited by TIA only address the Phase I timetable.<sup>11</sup>

Other petitioners opposing the Phase II implementation schedule set forth in the Report and Order present no compelling reason for the Commission to abandon this timetable. Nokia, arguing that it is presently too soon to determine the accuracy that will be possible, ignores the Commission's

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<sup>7</sup> Report and Order at ¶ 68 (emphasis added).

<sup>8</sup> PCIA Petition at 16-17.

<sup>9</sup> Comments of Motorola, Inc. (CA) at 7.

<sup>10</sup> Reply Comments of Motorola, Inc. (CA) at 3 (citing need for testing and deployment in the field under real world circumstances"); Motorola, Inc. Letter dated September 3, 1996. Assurances are not needed from Motorola for the Commission to require that localization capabilities be established in the public interest.

<sup>11</sup> Comments of Northern Telecom, Inc. (CA) at 4-6.

flexibility in giving the industry five years to meet the 125 meter rms requirement.<sup>12</sup> PCIA complains that the Phase II timetable is "overly ambitious" because standards have yet to be promulgated and agreed to by the industry.<sup>13</sup> However, the Commission has promulgated the standard for location accuracy, and five years is more than enough time for the industry to address its attendant issues. If the Commission were to adopt PCIA's recommendation to wait, the benefits of location technology, which are available today, would be further delayed, according to PCIA as much as three years,<sup>14</sup> to the detriment of public safety and public demand.

BellSouth has taken a slightly different approach in urging the Commission to abandon the Phase II implementation schedule. BellSouth purportedly solicited technical and product-planning information from most, if not all, "equipment vendors and organizations involved in 911, wireless, and location technology businesses regarding the ability to provide detailed location information."<sup>15</sup> Without describing its assessment criteria, BellSouth represents to the Commission that no single response satisfied all of BellSouth's diverse communications systems needs and that, therefore, five years is an insufficient amount of time in which to comply with the 125 meter rms requirement. In its response to BellSouth's information request, KSI referred BellSouth to the types of information it has filed in this proceeding, but felt it was inappropriate to provide BellSouth with a detailed description of planned innovations at this point. KSI suspects that other vendors reacted similarly. KSI expressed eagerness to reconvene discussions of its location technology with BellSouth so that

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<sup>12</sup> Nokia Petition at 3.

<sup>13</sup> PCIA Petition at 12.

<sup>14</sup> Id. at 13.

<sup>15</sup> BellSouth Petition at 10-11.

BellSouth, whose commitment to the goal of this docket cannot be doubted, will be able to find a solution acceptable to both it and its customers.

B. The Commission Should Not Abandon the Root Mean Square Techniques Set Forth in the Report and Order.

KSI applauds the Commission for clarifying that its location accuracy requirement is to be applied as a root-mean-square ("rms") standard. The use of the rms value inherently introduces the realization of the probabilities involved in the estimation of a location. An important consideration in the Consensus Agreement was the necessity for acknowledging the statistical (probabilistic) nature of the location estimation process in the specification of location accuracy requirements. Recognizing this, KSI suggested, in prior submissions for Consensus and the Commission's considerations, that the location requirement be expressed as a "radius of circular error probability ("Rcep") at a specified "confidence level" (i.e., a specific probability of containment). The statistical interpretation and implications of such specification requirements are well-known and commonly understood in the localization-systems industry. Instead, the Commission has adopted the recommendation of the Consensus Agreement to specify the location requirement as an rms standard, which has an alternative, but well defined, statistical interpretation associated with it.

An accuracy requirement such as 125 meters is not an enforceable requirement unless the statistical confidence level at which it applies is specified. The absence of such a specification in the early proceedings prompted concern that the 100 percent confidence level was to be inferred. However, no method of location estimation can be accurate to any reasonable standard within a 100 percent confidence limit. Thus it was essential for the Commission to specify a confidence level, or its equivalent, at which the accuracy standard is to apply. This has been equivalently

accomplished by the specification that the accuracy standard must be met as a "root mean square" value.

C. KSI Supports the Commission's Adoption of Latitude and Longitude as the Required Representation for Location Information.

The Commission has specified that the location information for a wireless 911 call shall be provided to the PSAP in the form of latitude and longitude. This representation of location is the distortion-free form used to express a position on the globe unambiguously and accurately. By specifying that the location information shall be transferred across the interface to the PSAP in the latitude-longitude ("lat-lon") form, the Commission has established the basis for common interface and system-application designs and that are not encumbered with the vagaries of local distortions. This interface format will enable lower cost design, configuration management, and production of the necessary interface equipment for the transfer of the location information to the PSAP. With accommodation of this interface, the PSAP facilities can be selected to project the location lat-lon coordinates into whatever planar form is desired (for display or other application), and these facilities can also be modified to form other projections without the need either for a two-stage transformation through the intermediate lat-lon form or for modification to the interface equipment on either side of the interface. Also, with the facility to accept and correctly interpret location information in the lat-lon form, the PSAP will be prepared to receive and apply such information received from other systems that may use it or from callers that may recite such information displayed on a GPS device.

Many transformations exist that are routinely used to project latitude and longitude coordinates into approximate forms that represent orthogonal distance coordinates on a flat, two-

dimensional plane.<sup>16</sup> The mathematical transformations involved in these projections are relatively straightforward, and any of them could be easily implemented on either side of an interface between the holder of location information and its recipient (e.g., the PSAP). The two-dimensional, planar projections are useful for approximate displays in the form of paper or screen maps. However, since the globe is not a flat surface, the projections all are referenced to particular meridians and/or parallels and all involve distortions that grow larger for locations that are farther from the reference points or loci. In order to maintain acceptable accuracy in a projection, its references are selected to be within a tolerable distance of the locale for which the projection is applied, and these references must be included in the calculations involved in the projection from the globe to the plane, or its inverse from the plane to the globe.

Two forms of projections are very commonly used in the U.S. -- the Transverse Mercator projection and the Lambert Conformal projection. For the so-called "State Plane Coordinate System," a location is expressed as "X" and "Y" distances (in feet) from an origin point that is distinct for each state. The mathematical relations between these coordinates and the lat-lon coordinates are Transverse Mercator for states with more north-south than east-west extent, and are Lambert Conformal for states with more east-west than north-south extent. A more "universal" projection is the Universal Transverse Mercator ("UTM") transformation, for which the planar coordinates are in meters and the reference meridians are equi-separated longitudes that are not particular to geo-political boundaries. The planar, UTM coordinates will be most distorted at the seams between projections with different reference meridians, and any positional interpretations for

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<sup>16</sup> Precise, definitive descriptions of these "projections" are provided in U.S. Geological Survey Professional Paper 1395, titled "Map Projections--A Working Manual", by John P. Snyder.



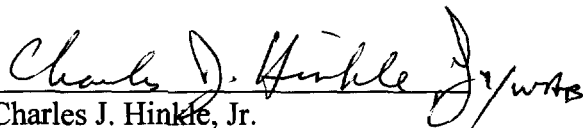
a region that includes such a seam would be required to properly apply a change in the coordinate origin for locations on either side of the seam.

Considering these interface design issues, KSI encourages the Commission to maintain the use of the lat-lon format for the transfer of location information to the PSAP. The use of this format will promote nationwide commonality of the interface, with associated reductions in manufacturing costs, and will support a robust interface that encourages the flexibility in the PSAP facilities to isolate display options to the side of the interface on which changes would logically occur. In fact, for enhanced accuracy, it is possible that the calculation of a location may be performed in a planar projection system that is not the same as that chosen by a local PSAP for displays. In such circumstance, the lat-lon system is the common coordinate system to which both projections are related, and transformations from one to the other go through the lat-lon system. Nevertheless, if it is deemed necessary or appropriate to provide location coordinates in accord with a particular planar projection, then such a transformation will be simple to implement prior to the data transfer.

D. Conclusion

KSI respectfully urges the Commission to maintain the Phase II implementation schedule, to resist abandoning root mean square techniques for establishing the Phase II location requirements, and to continue to promote the establishment of generic interfaces by specifying that location information be provided in the form of latitude and longitude for the provision of E911 services.

**Respectfully submitted,  
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October 8, 1996

**CERTIFICATE OF SERVICE**

I, W. Ashby Beal, Jr., hereby certify that on this 8th day of October, 1996, a copy of the foregoing Opposition of KSI Inc. and MULOC Inc. to Petitions for Reconsideration and Clarification was mailed via first-class mail, postage prepaid, to the following:

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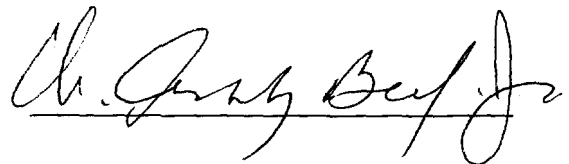
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